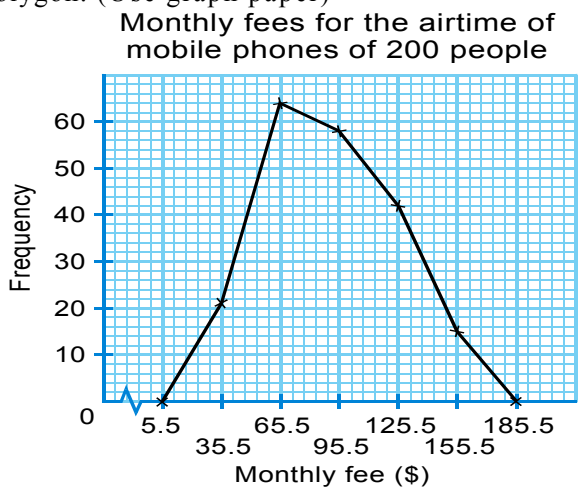
Y8 Revison Exercise
Statistics – Sugested Solution

Fundamental Question

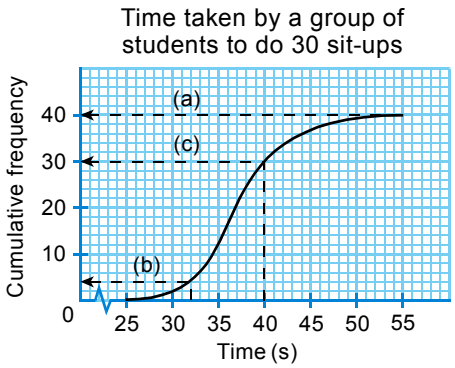
1. (a) The following table shows the monthly fees for the airtime of mobile phones of 200 people. Complete the table.

Monthly fee ($)	Class mark ($)	Frequency
21 - 50	35.5	21
51 - 80	65.5	64
81 - 110	95.5	58
111 - 140	125.5	42
141 - 170	155.5	15

(b) Draw a frequency polygon. (Use graph paper)



2. The following cumulative frequency curve shows the time taken by a group of students to do 30 sit-ups.



(a) How many students are there in the group?

Workings: See the graph

Answer: From the graph, there are $\underline{\underline{40}}$ students in the group.

(b) How many students have done 30 sit-ups in less than 32 s?

Workings: (show workings on the graph)

Answer: From the graph, $\underline{\underline{4}}$ students have done 30 sit-ups in less than 32 s.

(c) For students who have taken 40 s or more to finish 30 sit-ups, they need to do another 30 sit-ups. How many students need to do the additional 30 sit-ups?

Workings: (show workings on the graph)

Answer: From the graph, the number of students who have taken less than 40 s to finish 30 sit-ups = 30

$\therefore$ The number of students who need to do the additional 30 sit-ups $= 40 - 30 = \underline{\underline{10}}$.

3. For a cumulative frequency curve showing 140 data,

(a) the cumulative frequency corresponding to P_{40} is 56.

(b) the cumulative frequency corresponding to P_{90} is 126.

(c) the cumulative frequency corresponding to the upper quartile is 105.

(d) the cumulative frequency corresponding to the lower quartile is 35.

4. The high jump records of 6 boys are as follows:

172 cm, 170 cm, 163 cm, 176 cm, 165 cm, 183 cm

Find the mean of the high jump records.

Workings:
$$= \frac{172 + 170 + 163 + 176 + 165 + 183}{6} \text{ cm}$$
$$= \underline{\underline{171.5 \text{ cm}}}$$

Answer: The Mean of the high jump records is *171.5 cm*

5. The respective weights of ten pumpkins are 5.4 kg, 6.5 kg, 4.8 kg, 7.2 kg, 8.0 kg, 6.8 kg, 7.5 kg, 7.2 kg, 8.4 kg and 7.0 kg. Find the median weight of these ten pumpkins.

Workings: Arrange the weights of ten pumpkins (in kg) in ascending order:

4.8, 5.4, 6.5, 6.8, 7.0, 7.2, 7.2, 7.5, 8.0, 8.4

$$= \frac{7.0 + 7.2}{2} \text{ kg}$$
$$= \underline{\underline{7.1 \text{ kg}}}$$

Answer: Mean weight of these ten pumpkins is 7.1 kg

6. Find the modal class of the following sets of data.

Class interval	1 - 3	4 - 6	7 - 9	10 - 12	13 - 15	16 - 18
Frequency	2	9	19	14	19	14

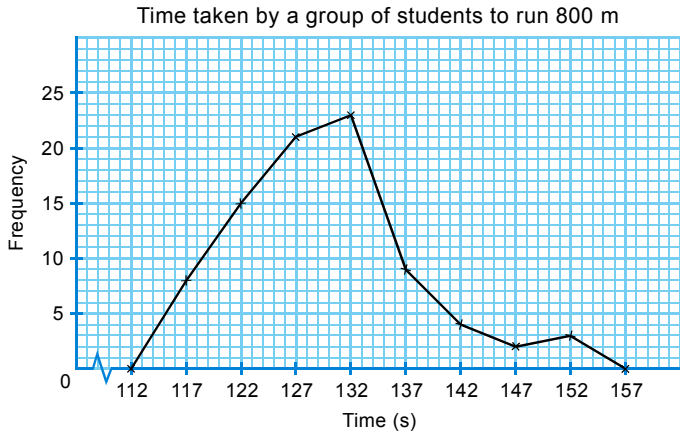
Workings: (circle the answer on the table)

[The frequencies of the class intervals 7 - 9 and 13 - 15 are the highest.]

Answer: Modal classes = $\underline{\underline{7 - 9 \text{ and } 13 - 15}}$

Consolidation Question

7. The following frequency polygon shows the time taken by a group of students to run 800 m.



(a) Based on the above frequency polygon, complete the following table.

Time (s)	Class mark (s)	Frequency
115 - 119	117	8
120 - 124	122	15
125 - 129	127	21
130 - 134	132	23
135 - 139	137	9
140 - 144	142	4
145 - 149	147	2
150 - 154	152	3

(b) How many students are there in the group?

Workings: Number of students in the group

$= 8 + 15 + 21 + 23 + 9 + 4 + 2 + 3$

$= 85$

Answer $\therefore$ There are 85 students in the group.

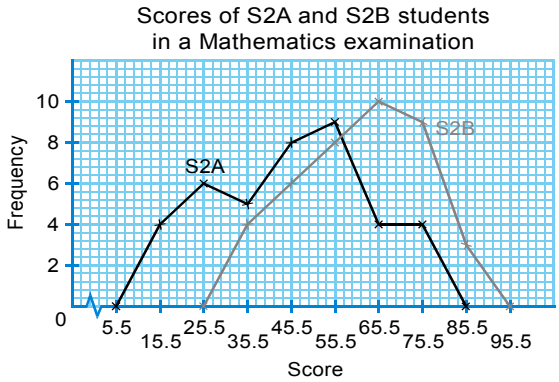
(c) i. Which class interval has the fewest students? ii. How many students are there?

Workings: (circle or highlight the class interval on the table)

Answer: i. The class interval 145 s - 149 s has the fewest students,

ii. there are 2 students.

8. The following frequency polygons show the scores of S2A and S2B students in a Mathematics examination.



(a) Which class has students with scores below 20.5?

Answer: _*S2A*_____

(b) If students with scores 80.5 or above will be awarded, how many students will be awarded in each class?

Workings: (show workings on the graph)

Answer: (**a**) S2A has students with scores below 20.5.

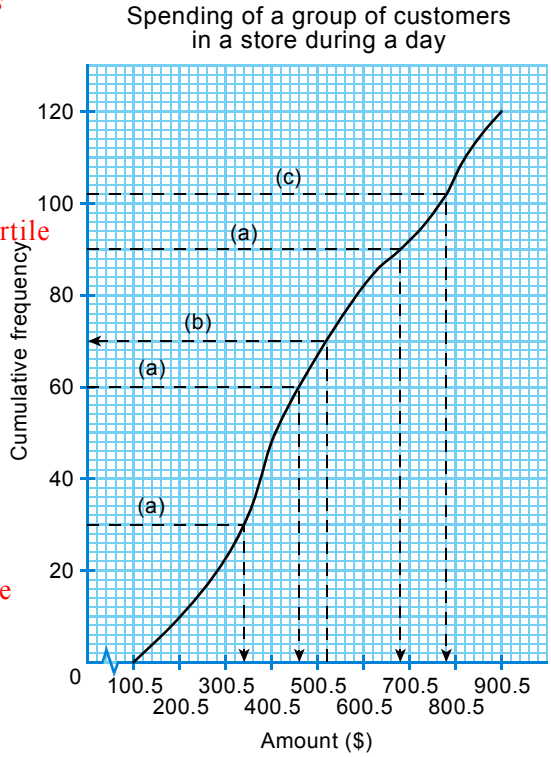
(b) No students will be awarded in S2A; 3 students will be awarded in S2B.

(c) S2B has a better performance.

(d) S2A needs to put more effort into mathematics.

Reasons: Because most of the students in S2A get lower scores

9. The cumulative frequency curve shows the spending of a group of customers in a store during a day.



(a) Find the lower quartile, median and upper quartile of the spending.

Workings: Cumulative frequency corresponding to the lower quartile

$= 120 \times 25\%$

$= 30$

From the figure, the lower quartile = $340.5

Cumulative frequency corresponding to the median

$= 120 \times 50\%$

$= 60$

From the figure, the median = $460.5

Cumulative frequency corresponding to the upper quartile

$= 120 \times 75\%$

$= 90$

From the figure, the upper quartile = $680.5

(b) If any customer who spends $520.5 or above will get a coupon, how many customers will get a coupon?

Workings: (show workings on the graph)

Answer: From the graph, 70 customers will spend less than $520.5.

∴The number of customers who will get a coupon

$= 120 - 70$

$= 50$

(c) If any customer who spends $800.5 or above will get a gift, and the amount spent by Carrie is P_{85}, can she get the gift? Explain briefly.

*Answer with reason: Carrie is the 120*0.85=102 customer.*
According to the graph, P85=$780.5, which is less then 800.5, therefore, she will not get a gift.

10. The following frequency distribution table shows the time spent by a group of people in watching TV last week.

Time (hour)	Class mark *x* (hour)	Frequency *f*	*fx* (hour)
16 - 20	18	15	270
21 - 25	23	25	575
26 - 30	28	30	840
31 - 35	33	20	660
36 - 40	38	10	380
	Total	100	2725

(a) Complete the table.

(b) Find the mean time spent by the group of people in watching TV last week.

Workings: Mean time spent in watching TV

$= \frac{2\,725}{100}$ hours

Answer: $= 27.25$ hours

11. The following stem-and-leaf diagram shows the sales volume of vacuum cleaners achieved by a salesperson in the past 10 days. Find the mode of the sales volume.

Sales volume of vacuum cleaners

Stem (10)	Leaf (1)
0	3 3 4 4 4 7 8
1	0 2
2	0

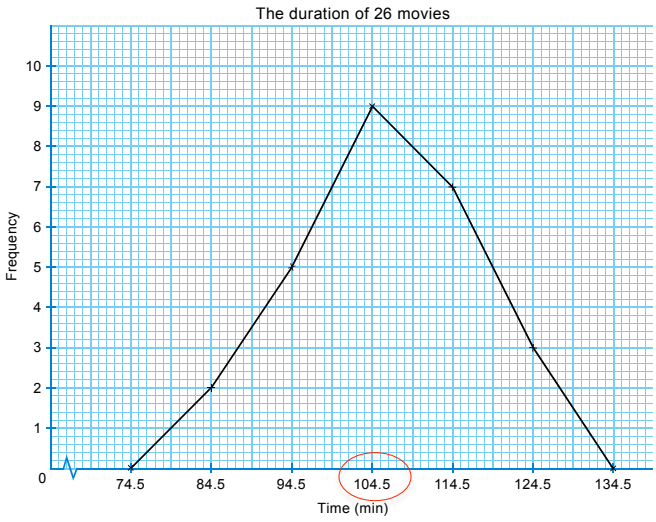
Workings: (circle or highlight the numbers in the stem-and-leaf diagram)

Answer: The mode of the sales volume is 4

12. The following frequency polygon shows the duration of 26 movies. The first class interval is 80 min - 89 min. Find the modal class of the duration of the movies.

Workings: (circle or highlight the modal class in the frequency polygon)

Answer: From the graph, you can see the modal class is 100-109



Challenging Question

13. The following is the average monthly service time (in h) of 50 volunteers in a social service centre.

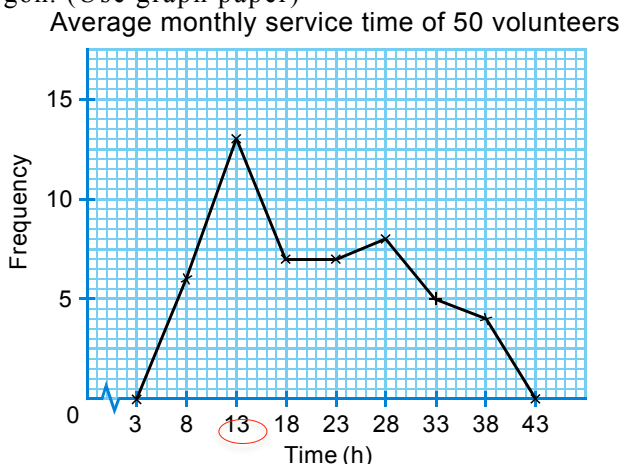
16	27	14	23	25	7	8	26	14	33
33	38	19	7	12	33	27	15	7	16
20	11	12	27	22	22	11	13	25	12
8	16	28	35	16	23	14	18	14	31
37	6	14	29	39	13	27	37	21	26

(a) Construct a frequency distribution table using 6 h - 10 h as the first class interval, and list the class mark of each class.

Time (h) (Class interval)	Class mark (h)	Class boundary (h)	Tally	Frequency
6 - 10	8	5.5 – 10.5	𝍸/	6
11 - 15	13	10.5 – 15.5	𝍸 𝍸///	13
16 - 20	18	15.5 – 20.5	𝍸//	7
21 - 25	23	20.5 – 25.5	𝍸//	7
26 - 30	28	25.5 – 30.5	𝍸///	8
31 - 35	33	30.5 – 35.5	𝍸	5
36 - 40	38	35.5 – 40.5	////	4

Answer (Use ruler to draw the table neat and tidy. Show class interval, class boundary, class mark, tally and frequency)

(b) Draw a frequency polygon. (Use graph paper)



(c) If a volunteer is chosen randomly, which class interval does the service time of this volunteer most possibly fall into?

Workings: (circle or highlight the modal class in the frequency polygon)

Answer: The service time of this volunteer most possibly falls into the class interval 11 h - 15 h.

14. The following frequency distribution table shows the lifetime of brands A and B batteries.

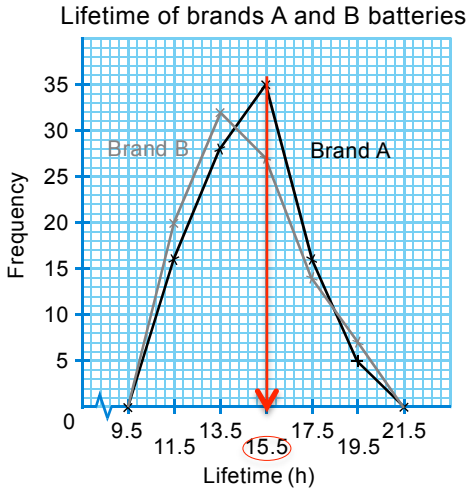
Lifetime (h)	11 - 12	13 - 14	15 - 16	17 - 18	19 - 20
Brand A	16	28	35	16	5
Brand B	20	32	27	14	7

(a) Draw frequency polygons on the same figure to show the lifetime of brands A and B batteries.

Working: Draw the frequency distribution table in the space provided first.

Lifetime (h)	11 - 12	13 - 14	15 - 16	17 - 18	19 - 20
Lifetime (h) Class mark	11.5	13.5	15.5	17.5	21.5
Brand A	16	28	35	16	5
Brand B	20	32	27	14	7

Then draw the frequency polygons on graph paper.



(b) Which batteries, brands A or B, have longer lifetime in general?

Answer with reason: Brand A batteries have longer lifetime in general, since the polygon of brand A shift to the longer lifetime side (right hand side).

(c) If a Brand A battery is chosen, which class interval does its lifetime most possibly fall into?

Workings: (circle or highlight the modal class in the frequency polygon)

Answer: From the graph, you can clearly see that the modal class for Brand A is 15-16 hours, therefore if a Brand A battery is chosen, its lifetime most possibly falls into the class interval 15 h - 16 h.

15. The following is the time spent (in min) by S2C students on internet during a day.

71	100	116	23	185	65	94	12	135	139
89	37	10	202	74	209	163	28	115	55
41	125	235	195	119	94	169	56	54	49
139	134	21	174	221	164	29	210	121	145

(a) Construct a frequency distribution table using 1 min - 30 min as the first class interval.

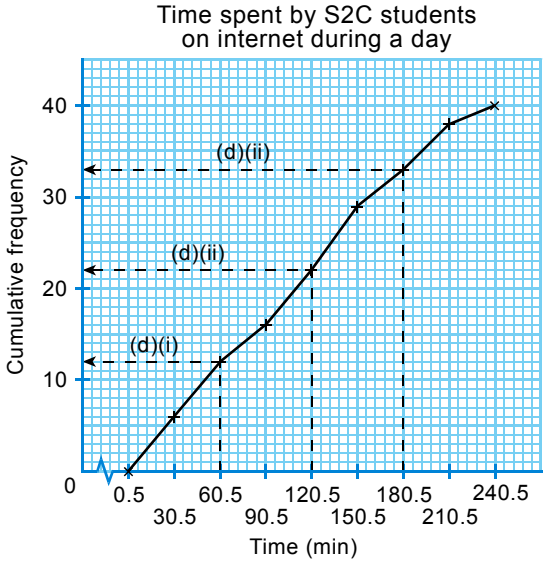
(b) Construct a cumulative frequency table.

Answer both a and b on the same table (Use ruler to draw the table neat and tidy. Show class interval, class boundary, class mark, tally and frequency and cumulative frequency)

Time (min)	Tally	Frequency	Class boundary (less than/ min)	Cumulative frequency
1 - 30	𝍸/	6	30.5	6
31 - 60	𝍸/	6	60.5	12
61 - 90	////	4	90.5	16
91 - 120	𝍸/	6	120.5	22
121 - 150	𝍸//	7	150.5	29
151 - 180	////	4	180.5	33
181 - 210	𝍸	5	210.5	38
211 - 240	//	2	240.5	40

(c) Draw a cumulative frequency polygon. (Use graph paper)

[Horizontal scale: 5 squares = 30 min; vertical scale: 10 squares = 10 students.]



(d) Hence

(i) find the number of students spending 60.5 min or above on internet.

Workings: (show working by drawing suitable lines in the cumulative frequency polygon)

Answer: From the graph, the number of students spending less than 60.5 min on internet = 12

$\therefore$ The number of students spending 60.5 min or above on internet

$= 40 - 12$

$= \underline{\underline{28}}$

(ii) find the percentage of students spending 120.5 min to 180.5 min on internet.

Workings: (show working by drawing suitable lines in the cumulative frequency polygon)

Answer: From the graph, the number of students spending 120.5 min to 180.5 min on internet

$= 33 - 22$

$= 11$

Required percentage: $= \frac{11}{40} \times 100\%$

$= \underline{\underline{27.5\%}}$

16. The following frequency distribution table shows the volumes of a batch of bottles of juice.

Volume (mL)	Frequency
280 - 284	2
285 - 289	6
290 - 294	8
295 - 299	10
300 - 304	6
305 - 309	16
310 - 314	12
315 - 319	20

(a) Construct a cumulative frequency table.
Workings (Use ruler to draw the table neat and tidy. Show class interval, class boundary, class mark, tally and frequency and cumulative frequency)

Volume (mL) Class interval	Volume (mL) Class mark	Frequency	Volume less than (mL)	Cumulative frequency
NA	NA	0	279.5	0
280 - 284	282	2	284.5	2
285 - 289	287	6	289.5	8
290 - 294	292	8	294.5	16
295 - 299	297	10	299.5	26
300 - 304	302	6	304.5	32
305 - 309	307	16	309.5	48
310 - 314	312	12	314.5	60
315 - 319	317	20	319.5	80

(b) Draw a cumulative frequency polygon. (Use graph paper)
[Horizontal scale: 5 squares = 5 mL; vertical scale: 5 squares = 10 bottles of juice.]

(c) Hence

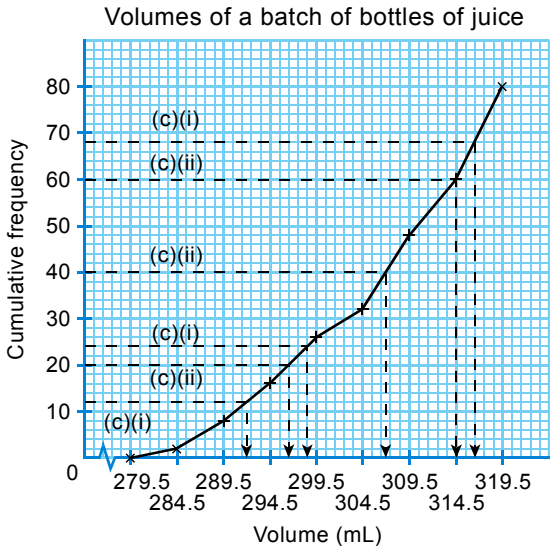
(i) find P_{15}, P_{30} and P_{85}.

Workings and answer From the figure:

Cumulative frequency corresponding to $P_{15} = 80 \times 15\%$, $P_{15} = \underline{\underline{292 \text{ mL}}}$
$= 12$

Cumulative frequency corresponding to $P_{30} = 80 \times 30\%$, $P_{30} = \underline{\underline{298.5 \text{ mL}}}$
$= 24$

Cumulative frequency corresponding to $P_{85} = 80 \times 85\%$, $P_{85} = \underline{\underline{316.5 \text{ mL}}}$
$= 68$



(ii) find the lower quartile, median and upper quartile of the volumes.

Workings and answer

Cumulative frequency corresponding to the lower quartile $= 80 \times 25\%$
$= 20$.

From the figure, the lower quartile $= \underline{\underline{296.5 \text{ mL}}}$

Cumulative frequency corresponding to the median $= 80 \times 50\%$
$= 40$.

From the figure, the median $= \underline{\underline{307 \text{ mL}}}$

Cumulative frequency corresponding to the upper quartile $= 80 \times 75\%$
$= 60$.

From the figure, the upper quartile $= \underline{\underline{314.5 \text{ mL}}}$

17. The following shows the prices of mobile phones from two brands, Nobia and Sorry Edison.

Nobia				Sorry Edison				
\$480	\$980	\$1 480	\$1 780	\$399	\$699	\$1 099	\$1 299	\$1 699
\$2 680	\$3 280	\$4 380	\$5 680	\$2 499	\$3 099	\$3 699	\$4 499	\$5 999

(a) Find the mean price of mobile phones for each brand.

Working and answer:

(a) Mean price of mobile phones of Nobia

$$= \$\frac{480 + 980 + 1\,480 + 1\,780 + 2\,680 + 3\,280 + 4\,380 + 5\,680}{8}$$

$$= \underline{\underline{\$2\,592.5}}$$

Mean price of mobile phones for Sorry Edison

$$= \$\frac{399 + 699 + 1\,099 + 1\,299 + 1\,699 + 2\,499 + 3\,099 + 3\,699 + 4\,499 + 5\,999}{10}$$

$$= \underline{\underline{\$2\,499}}$$

(b) By considering the means, which brand set a lower selling price in general?

Working and answer:

By considering the means, "Sorry Edison" set a lower selling price in general.

18. The following back-to-back stem-and-leaf diagram shows the weights of 30 chickens from each farm.

The weights of 30 chickens from each farm

Farm A Leaf (0.1 kg)	Stem (1 kg)	Farm B Leaf (0.1 kg)
8 4 4	1	2 2 3 5 6 7 9
9 9 6 3 3 1 0	2	1 1 1 2 2 4 5 5 6 8 9
8 8 7 6 5 5 4 4 4 2 1 0	3	0 0 1 1 1 4 4 6 7 8
7 7 6 5 3 2 2 1	4	0 2

(a) Find the median weight of chickens from farm A.

Working and answer:

The median term is the 15th and 16th term; therefore, the median is 3.4kg.

(b) Find the median weight of chickens from farm B.

Working and answer:

The median term is the 15th and 16th term; therefore, the median is 2.5kg.

(c) (i) Draw a stem-and-leaf diagram to show the distribution of the weights of a total of 60 chickens from farms A and B.

Working and answer:

The weights of a total of 60 chickens from farms A and B

Stem (1 kg)	Leaf (0.1 kg)
1	2 2 3 4 4 5 6 7 8 9
2	0 1 1 1 1 2 2 3 3 4 5 5 6 6 8 9 9 9
3	0 0 0 1 1 1 1 2 4 4 4 4 4 5 5 6 6 7 7 8 8 8
4	0 1 2 2 2 3 5 6 7 7

(ii) Hence find the median weight of these 60 chickens from farms A and B.

Working and answer:

The median term is the 30th and 31st term; therefore, the median is 2.0 kg.

19. The following frequency distribution table shows the ages of 200 students in a Japanese language school where x and y are positive integers.

Age	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45
Frequency	30	42	$40 + x$	34	y	19

(a) Can the modal class be 36 - 40? Explain briefly.

Working and answer:

∵ Total frequency = 200

$\therefore \quad 30 + 42 + 40 + x + 34 + y + 19 = 200$

$x + y + 165 = 200$

$y = 35 - x$

∵ x and y are positive integers and $y = 35 - x$.

∴ The largest value of y is 34,

i.e. $y < 42$.

∴ The modal class cannot be 36 - 40.

(b) If the modal class is 26 - 30, write down two sets of possible values of x and y.

Working and answer:

If the modal class is 26 - 30, then

$40 + x > 42$

$x > 2$

When $x = 3$,

$y = 35 - 3$

$= 32$

When $x = 10$,

$y = 35 - 10$

$= 25$

∴ $x = 3,\ y = 32$ and $x = 10,\ y = 25$ are two sets of possible values of x and y.

(any other sets of possible values of x and y are acceptable)